Library

HONOLULU
LA JOLLA
MONTEREY
TIBURON

SWFC LIBRARY

FEB 1 5 1981

National Marine Fisheries Service
2570 Dole Street
Honolulu, Hawaii

SOUTHWEST FISHERIES CENTER

MONTHLY REPORT - NOVEMBER 1980

TABLE OF CONTENTS AND RESEARCH HIGHLIGHTS

Page

PUBLICATIONS 1

LA JOLLA SCIENTISTS RECIEVE DOC MEDALS 3

HONOLULU LABORATORY 5

Kawakawa Learns to Discriminate Between Altered and Normal Magnetic Field Intensities 5

LA JOLLA LABORATORY 10

Stauffer Presents Stock Assessment Lectures at CICIMAR 14
Center Scientists Participate in 40-Day Cruise to Study Black Cod Resources 16
Peruvian Anchovetta Biomass Assessment Plan Proposed 17
Unusual Whale Strands on Beach in La Jolla 28

TIBURON LABORATORY 33

Fishermen and Researchers Interested in Development of Octopus Fishery 36

SOUTHWEST REGIONAL DATA MANAGEMENT AND ADP OPERATIONS 38

MISCELLANEOUS 40

Honors and Awards, Seminars, Public Affairs, Visitors, Meetings and Travel and Personnel 40

NOAA/NMFS

To change the delivery address of the Southwest Fisheries Center Monthly Report, or to cancel your subscription, please notify:

Editor, Southwest Fisheries Center
P. O. Box 271
La Jolla, California 92038

IZADORE BARRETT, Center Director
JOHN F. CARR, Deputy Director
LILLIAN VLYMEN, Editor

SOUTHWEST FISHERIES CENTER

LA JOLLA, CALIFORNIA

HONOLULU LABORATORY
LA JOLLA LABORATORY
TIBURON LABORATORY
PACIFIC ENVIRONMENTAL GROUP

MONTHLY REPORT - NOVEMBER 1980

STATUS OF PUBLICATIONS

Published

Balazs, George H. 1980. Synopsis of biological data on the green turtle in the Hawaiian Islands. NOAA Tech. Memo. NMFS-SWFC-7, 141 p.

Cramer, Jean I., Richard S. Shomura, and Heeny S. H. Yuan [sic]. 1978. The problem of burnt tuna in the Hawaiian fishery. Indo-Pac. Fish. Comm., Proceedings, 18 Sess., Sect. III:213-223. [Received November 1980.]

The poor quality of the flesh of 'burnt tuna' results in an economic loss to the tuna industry. Rejection of burnt tuna by the consumer is based on visual and taste shortcomings. The present report describes the extent of this problem in the Hawaiian tuna fishery and provides some preliminary results of an ongoing study to understand the phenomenon.

Perrin, W. F. and J. E. Powers. 1980. Role of a nematode in natural mortality of spotted dolphins. Journal of Wildlife Management, 44(4): 960-963.

Approved by Center Director

Huppert, Daniel D. Economic analysis for northern anchovy management. For consideration for publication in paper to be presented to the Workshop on Economic Analysis in Fisheries Management Plans, University of Delaware.

THIS REPORT DOES NOT CONSTITUTE PUBLICATION AND IS FOR INFORMATION ONLY.

Translation

Harada, Teruo. 1980. Progress and future prospects in tuna culturing studies (Maguro-rui no yōsei kenkyu no shinten to tenbō). In Proc., 1979 Jpn. Tuna Fish. Res. Conf., Jpn. Fish. Agency, Far Seas Fish. Res. Lab., July 1980, p. 50-58. (Engl. transl. by Tamio Otsu, 1980, 11 p., Transl. No. 50; available Southwest Fish., Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96812)

Administrative Reports

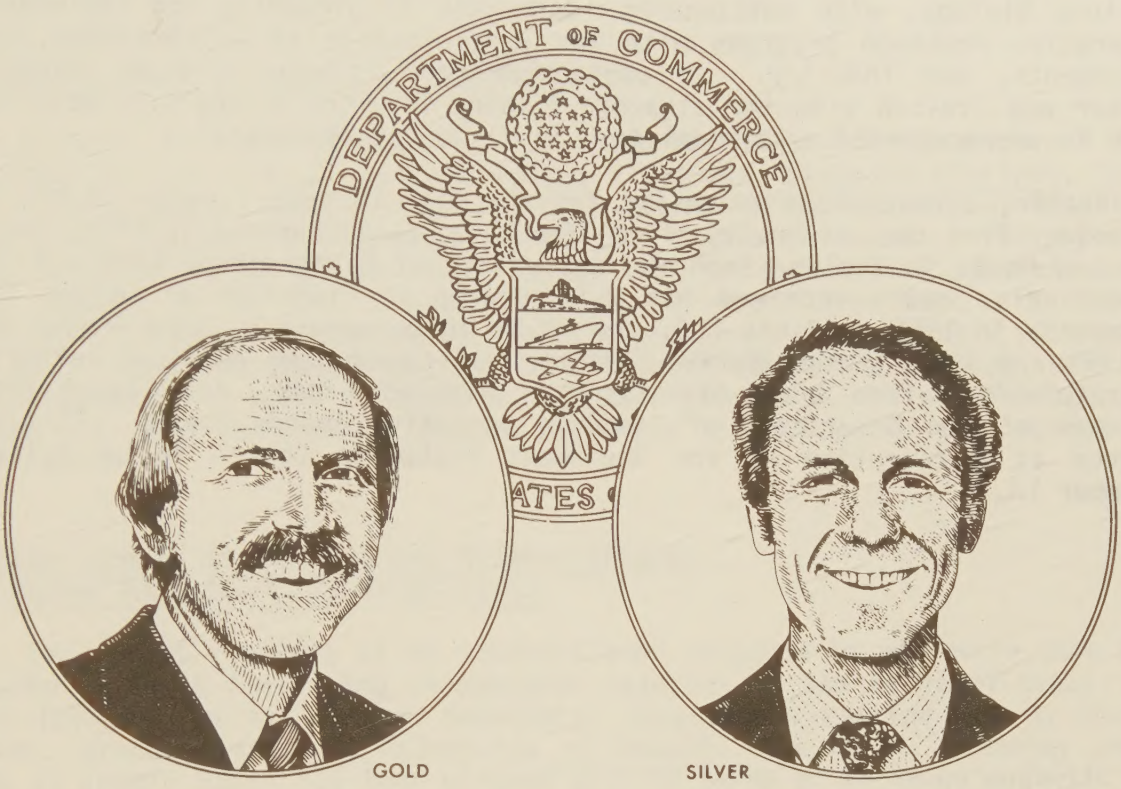
Honolulu Laboratory

Polovina, J. J. 1980. Gear competition in lobster trapping in the Northwestern Hawaiian Islands. SWFC Admin. Rep. H-80-14.

Everson, A. R. 1980. Seamount fishery, foreign vessel observer report, Kitakami Maru (August 9-October 4, 1980). SWFC Admin. Rep. H-80-15.

Everson, A. R. 1980. Seamount fishery, foreign vessel observer report, Aso Maru (September 24-30, 1980). SWFC Admin. Rep. H-80-16.

CONGRATULATIONS



DR. JOHN HUNTER **DR. MICHAEL LAURS**

LA JOLLA SCIENTISTS RECEIVE DOC MEDALS

This month, Dr. John Hunter and Dr. Michael Laurs of the Southwest Fisheries Center's La Jolla Laboratory, were awarded Department of Commerce (DOC) Medals by Secretary Philip M. Klutznick, in a ceremony held in Washington, D.C. Dr. Hunter, a Fishery Biologist, received the DOC Gold Medal, and Dr. Laurs, a Research Oceanographer, received the DOC Silver Medal. The DOC Medal Awards are given annually to recognize those people who demonstrate exceptional and sustained effort toward accomplishment of the NMFS mission.

Dr. Hunter and Dr. Laurs were notified of their awards last month in letters from Terry Leitzell, NOAA Assistant Administrator. Hunter was honored "...for pioneering in the science of fish behavior, particularly the behavior of schooling clupeoid fishes, such as anchovy, sardine, and herring. You have combined field and laboratory appraches in meaningful ways, resulting in the

discovery of new biological principles on the early ecology of marine fishes with emphasis on the mechanisms responsible for mortality in their early stages of life. The impact of your work has been national and international in scope."

Laurs received his award "...For scientific contributions to oceanography and tuna biology, with outstanding leadership in promoting and implementing cooperative research programs with the participation of universities, state governments, and industry. Of particular note is your role as scientific adviser and liaison with the albacore fishing industry of the U.S. West Coast which is unprecedented as a model in U.S. fisheries research."

Hunter, a government scientist for the past 18 years, received his B.A. in Zoology from the University of California at Santa Barbara in 1956, and his M.S. and Ph.D. in Zoology from the University of Wisconsin in 1958 and 1962, respectively. Laurs received his B.S. degree in Fisheries at Oregon State University in 1961, and his M.S. and Ph.D. in Oceanography from Oregon State in 1963 and 1967, respectively. Hunter and Laurs also received letters of congratulations from NOAA Administrator Richard Frank, and Joseph Brown, Chairman of the Department of Commerce Incentive Awards Board. They were honored at a reception at the Southwest Fisheries Center in La Jolla on November 13.

HONOLULU LABORATORY

PELAGIC RESOURCES INVESTIGATION

New Amphipod Species Found in Seabird Spew

Fishery Biologist Thomas S. Hida reported that a large amphipod found recently in the spew of a black-footed albatross, Diomedia nigripes, turned out to be a species new to science. This determination was made by Dr. Thomas E. Bowman, Curator of Crustacea at the U.S. National Museum. The amphipod, which measures about 300 mm long, is not only an undescribed species, but it also appears to be the largest amphipod collected thus far. The largest amphipod in museum collections is Alicella gigantea, which reaches a length of 140 mm. Large lysianassid amphipods, estimated to be 282 mm long, have been photographed at a depth of 5,304 m. Bowman and Dr. J. Laurens Barnard, also of the U.S. National Museum, plan to prepare a description of the amphipod for publication.

Kawakawa Learns to Discriminate Between Altered and Normal Magnetic Field Intensities

The recent findings of an unconditioned response by yellowfin tuna to an altered magnetic field, and of magnetic material in the heads of tunas, have been followed up by further behavioral experiments carried out by Michael Walker, graduate student, University of Hawaii. An 18-ft. diameter wooden tank at Kewalo Basin has been wrapped with 90 turns of 18 gauge magnetic wire which allows control of the total magnetic field intensity within the tank. A 50-V d.c. power supply provides sufficient power to double the vertical intensity within the tank or to reverse it. Increasing the vertical intensity within the tank corresponds to a poleward displacement while decreasing the intensity corresponds to a displacement toward the equator. Reversing the vertical intensity and, consequently, the field inclination, is equivalent to a shift into the opposite hemisphere.

A kawakawa has learned to discriminate between altered and normal magnetic field intensities in the magnetic intensity control tank. The fish was trained to make passes through a hoop lowered into the tank for 5-min trial periods. Rewards were given at random intervals averaging 60 sec during the trials. The fish was then trained to discriminate between the ambient magnetic field and increased magnetic field intensity by only rewarding passes made during trials when the field was altered. After initially increasing the numbers of passes made during the unrewarded trials, the fish soon learned to reduce the number of passes made during trials with the normal magnetic field intensity. On the seventh and eighth days of training, the differences between the number of passes made during the rewarded and unrewarded trials were significant at the 0.05% level (Wilcoxon's signed-ranks test).

The earth's magnetic field is a pervasive orientational cue available in the pelagic oceanic environment. Local and regional variations in the intensity of the earth's field can provide a considerable amount of useful information to migratory species possessing sensitive magnetic sense organs. The discrimination of an alteration on magnetic intensity by the kawakawa provides further evidence that tunas are capable of using the earth's magnetic field to carry out their migrations. Subsequent experiments to be carried out by Walker include determination of the discrimination threshold in kawakawa. It is anticipated that the fish may be able to detect changes of 1% or less in the earth's magnetic field intensity.

Tuna Energetics Study Continues

Chris Boggs, University of Wisconsin, and Dr. Andrew E. Dizon, Leader of the Pelagic Ecosystem Study, are using data on the weight loss of starved tuna to estimate long-term energy expenditure at measured swim speeds. Net weight data on over 100 skipjack tuna and kawakawa held in tanks at the Kewalo Research Facility were compared with data on wild tuna. At low activity levels, tuna lost about 1.8% of their weight daily.

The water content of tuna increases during starvation, thus dry weights must be examined to determine changes in biomass. Dry weight and caloric density of transverse sections and samples of red and white muscle tissue are being compared with data on whole fish to assess the reliability of sub-sampling procedures.

A technique to repeatedly weigh live tuna has been used extensively to monitor the growth of feeding tuna. Survival has been excellent. Data on feeding fish are being used to estimate the maintenance ration for tuna at low activity levels.

An important objective of this study is to determine the most efficient swimming speed for tunas. Attempts to increase the activity level of captive tuna produced an interesting result. Initially, fish that were force-fed weights swam faster than unweighted fish, overcoming their decreased buoyancy by increasing their hydrodynamic lift. After several days, however, these fish increased their attack angle, swimming "uphill," and slowed to minimum speed. This result was again observed when pectoral fins were clipped to reduce lift. An initial increase in velocity was followed by an increase in attack angle and decreased velocity. The latter technique proved less traumatic to the fish. Most weighted fish died within 2 to 5 days.

More data on tuna at higher activity levels must be collected to determine the efficiency of various swimming speeds. This information will be used to formulate predictive models for tuna migratory behavior.

INSULAR RESOURCES INVESTIGATION

Research Cruises to the Northwestern Hawaiian Islands Continue

Richard N. Uchida, Leader of the Insular Ecosystem Study, reported that the NOAA vessel, Townsend Cromwell, departed Honolulu on November 3 for Part II of cruise TC-80-05 to the Northwestern Hawaiian Islands (NWHI).

The missions of the cruise are to conduct surveys of monk seals, Monachus schauinslandi, at Nihoa, Necker Island, French Frigate Shoals, Laysan Island, Lisianski Island, and Pearl and Hermes Reef, to continue the assessment of spiny lobster, shrimp, bottomfish, pelagic fish, and bentho-pelagic fish resources, and to assist in a University of Hawaii Sea Grant project to survey inshore reef flats for brown and red algae on which Gambierdiscus toxicus, a ciguatoxigenic dinoflagellate, grows as an epiphyte. Paul M. Shiota is Chief Scientist on the cruise and assisting him are Operations Research Analyst George W. T. Liao and Research Assistants Darryl T. Tagami, Steven H. Kramer, and Victor A. Honda.

Uchida departed Honolulu on November 22 for Midway Islands where he joined the field party on the Cromwell. He will serve as Chief Scientist until the end of the cruise on December 16.

Planning for Western Pacific Fishery Survey Underway

R. Uchida visited the La Jolla Laboratory to discuss data management procedures with several data managers and editors, in an effort to upgrade data management in the Honolulu Laboratory's Insular Ecosystem Study. In particular, he worked with Dave Mackett, Southwest Fisheries Center Planning Officer, and Oden Burris, Computer Programmer, to develop a project management system for the forthcoming survey and assessment of the fishery resources around Guam and the Northern Marianas Islands.

Uchida reported that implementation of some of the planned activities for the resource survey has already started. A manual to provide guidelines for anticipated field work in the Guam and Northern Mariana Islands areas is being prepared. He also completed bid specifications for a vessel charter and cruise instructions for 2 to 3 months of field work in the western Pacific.

Undersea Research Proposal Accepted

In response to a call for proposals from the Hawaii Undersea Research Laboratory Project (HURL), University of Hawaii, to use the submersible Makalii for research, a proposal, "Use of Makalii to assess species composition, distribution, and abundance of bottom fishes and lobsters relative to depth and bottom topography, and to study the structure of

deepwater reef communities in the Hawaiian Archipelago." was prepared by Fishery Biologist Reginald M. Gooding and submitted to HURL. The proposal has been accepted as one of the projects which will be conducted by Makalii during spring-summer 1981. Gooding and Dr. Edmund Hobson of thw Southwest Fisheries Center, Tiburon Laboratory, will be the investigators. The initial work will probably be conducted in the main islands. Subsequent studies are planned for the NWHI.

Relationship Derived to Estimate Absolute Abundance of Spiny Lobsters

Dr. Jeffrey J. Polovina, Statistician, analyzed data from intensive, commercial spiny lopbster trapping operations to obtain density estimates of spiny lobsters at Maro Reef. He also derived a relationship, $N = 1688 \cdot CPUE$, which estimates the number of lobsters > 8.25 cm carapace length per square kilometer (N) at any site in the NWHI for which there are data for lobster catch per trap-night (CPUE), based on trapping data obtained on cruises of the Townsend Cromwell. This relationship provides a means of estimating absolute abundance of adult lobsters on the various banks in the NWHI based on the Cromwell survey work.

Morphometric Relationships Computed for Northwestern Hawaiian Islands Fish Species

Fishery Biologist James H. Uchiyama and Computer Programmer Sally H. Kuba computed length-weight and standard length-fork length relationships for the important species in the NWHI handline fishery. The slopes of the length-weight relationships for each species were compared among banks and time of year, and between sexes. Significant differences ($P = 0.05$) for the slopes among banks and time of year were found only for the grouper, Epinephelus quernus. A single length-weight relation was, therefore, computed for each of the snapper and carangid species in the entire NWHI.

* * * * * * * * * * *

Richard Uchida completed the final Cruise Instructions for TC-81-01, reviewed three research proposals submitted to HURL involving the use of the submersible, Makalii, and prepared a progress report of the Ad Hoc Research Vessel Acquisition Committee for the Honolulu Laboratory Director.

FISHERY MANAGEMENT PROGRAM

Hawaii Skipjack Tuna Landings Continue Below Long-Term Average

The November 1980 Hawaii landings of skipjack tuna were estimated at 84.1

metric tons (MT), which is 62.9 MT above the November 1979 landings and 75.9 MT below the 1964-79 long-term average for November. The cumulative landings from January through November were estimated at 1,337.2 MT, which is 1,222.0 MT below the 1979 landings for the same period and 2,097.7 MT below the 1964-79 long-term average for the same period.

LA JOLLA LABORATORY

Coastal Fisheries Resource Division

ALBACORE FISHERIES PROGRAM

Satellite Remote Sensing Applications in Fisheries Research

As part of the albacore research program at the La Jolla Laboratory, Jose Pelaez, SIO graduate student, and Randee Recht, Remote Sensing Specialist, have reformatted and examined satellite images in support of the analysis of the November 1979 albacore cruise located in an offshore region halfway between Hawaii and the west coast of North America. The images were derived from eight NOAA-6 tapes (courtesy of National Environmental Satellite Services, Redwood City), in addition to three previously-reformatted images collected at Scripps Remote Sensing Facility. Reformatting is a site-specific function that converts satellite telemetry files into the image-related files. The output to the image-related files contains the computed coefficients for both the forward and inverse transformation between image sample coordinates and latitude/longitude coordinates.

Palaez and Recht were able to process 45 satellite images successfully, 28 of which have been retained for further processing and interpretation. The objective of this study is to locate and map thermal gradients associated with the sub-tropical front, and relate them to albacore migration and distribution patterns. Of the satellite passes examined to date, many have been severely limited by cloud cover typical of November weather in this region. To improve the usable data, the following methods have been incorporated into the processing: contrast stretching, which increases the resolution or detail of a given image within certain limits; gridding, in which the computer prints grids of latitude and longitude markings onto the image print-out; and experimentation with noise filters to eliminate or lessen noise which interferes or obscures the desired information on the tapes being received. Further processing will be concentrated on images having significant openings in the cloud cover. Recht is investigating various camera exposures and is developing alternatives which will improve the photographic results in duplicating an image off the CRT display. Photic Company of San Diego is assisting with the experimentation, using a new fine-grain, high resolution technical film.

* * * * * * * * * *

As part of studies in the CalCOFI program, Palaez has incorporated some of the Scripps Remote Sensing Facility's newly developed programs in the study of the red tide which occurred in the Southern California Bight during July 1980. The systematic acquisition of real-time satellite data off the coast of California and Baja California is being conducted concurrently with shipboard data collection of the CalCOFI program. Satellite data have been archived since November 25 and will continue for the duration of the CalCOFI year which ends August 30. In support of this data acquisition, GOES FAX (geostationary satellite facsimiles) are now being received at the La Jolla Laboratory. Established through the initiative of Dr. Michael Laurs and Richard Evans, this data link with the National Weather Service will provide a variety of enhanced and unenhanced products. These visible and infrared images are available on a 1/2 hourly basis and are received in four different scales. These GOES images will reveal regional cloud cover establishing a more efficient procedure in acquiring NOAA-6 passes.

Preliminary Studies Completed on Anchovy Energetics

Dr. John Hunter, Fishery Biologist, and Sandy Kaupp, Staff Research Associate, University of California, San Diego (UCSD), have completed a preliminary study on energetics of anchovy, in cooperation with Dr. George Somero, also of UCSD, that may establish a more accurate methodology for calculating energy budgets of marine fishes. Their objective is to develop a bioassay in the laboratory for estimating the extent of activity (movement) of anchovy in the sea. When the activity level of fish in the sea is established, an energy budget for anchovy will be determined in the laboratory under an exercise treatment that is a realistic simulation of normal levels of exercise in the sea. Preliminary work showed that the activity level of the respiratory enzyme citrate synthetase in the red muscle increased by 32% after prolonged exercise in the laboratory. Thus, citrate synthetase in red muscle may provide the basis for the required assay. This may have far-reaching effects for multispecies models, many of which incorporate energy relationships. Metabolism accounts for 50% or more of a fish's energy budget and is dependent primarily upon activity level. Activity levels in the sea for pelagic marine species are currently unknown and this produces uncertainties on the order of 2-4X in calculating energy budgets.

LARVAL FISHES, COASTAL EAST PACIFIC

Growth Stanzas of Northern Anchovy Larvae Studied

Fishery Biologist Gail Theilacker and Biological Technician Patricia Hadley are studying starved and fed larval northern anchovy in order to describe their growth stanzas as a function of larval weight. Anchovy eggs, collected from hormone-injected adults maintained at the NMFS aquarium, were

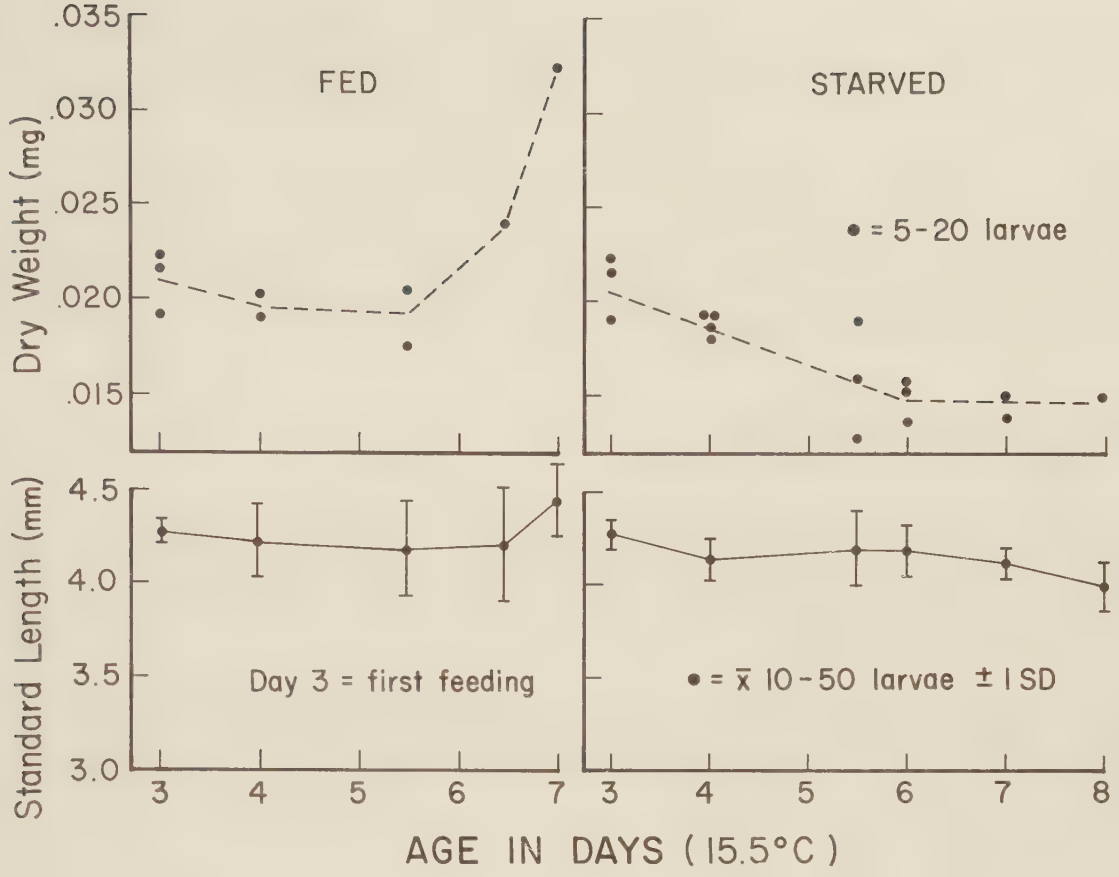
provided by Fishery Biologist Roger Leong. The larvae were hatched in 100-liter tanks maintained at 15.5°C; some were fed ad-libitum (freely) and others were starved. Larvae were sampled daily from both treatments. Live larvae were measured, washed in distilled water, and grouped into 0.2-0.3 mm size classes on a slide for subsequent dry weight measurements. To date, larvae up to eight days of age have been analyzed.

Yolk-sac larvae are known to grow rapidly, but a sudden decrease in growth rate occurs when the larvae switch from yolk nutrition to exogenous nutrition. Dr. John Hunter of the La Jolla Laboratory has shown that anchovy larvae are inefficient at capturing prey during the first days of feeding: it takes several days for larvae to learn how to capture food. Therefore, for larvae which are just beginning to feed, the cost of attacking prey must be relatively great. Dr. Charles O'Connell of the La Jolla Laboratory found that the histological condition of first-feeding northern anchovy was less robust in larvae which had been feeding for one day than in larvae which were starved. Most of the first-feeding northern anchovy larvae were not in a healthy, robust condition until they increased their capture efficiency, usually on the third day of feeding (at 5-6 days of age). At this time, their growth rate increased. Theilacker and Hadley noted a gain in weight of feeding larvae on the fourth day of feeding (see figure, next page).

The weight of feeding larvae was nearly constant during the three-day period after yolk absorption (until age 6 days), so the energy from food intake equalled the energy costs of maintenance (standard metabolism), feeding (metabolizing food), and activity (swimming and attacking prey). As the swimming activity and standard metabolism of both fed and starved larvae appears to be the same until age 6 days, the difference between caloric intake of feeding larvae and caloric expenditure (loss of body weight) of starving larvae should equal the energy used for attacking prey plus the energy cost of metabolizing food.

Theilacker and Hadley found that feeding larvae were always active, but starving larvae were active only during the first three days after yolk absorption (until age 6 days). During this period, starving larvae lost about 30% of their body weight, or about 10% a day. During the next two days, activity of starving larvae decreased and there was no further measurable weight loss. They began to sink, head down, although they continued to exhibit avoidance behavior.

This study supported the observation that standard length of fed anchovy larvae would remain constant for three to four days after first feeding. The mean length of fed larvae, about 4.2 mm, did not increase until four days after first feeding (day 7). This increase was small, about 0.25 mm, but the corresponding increase in weight (50%) was large. Starved larvae also retained a nearly constant body length, the same as those larvae fed after yolk absorption. Thus, starving larvae conserved their length while losing weight. Due to the static growth stanza of both fed and starved larvae after yolk absorption (4.0-4.5 mm), the numbers of 4.0-4.5 mm larvae collected in the field will be disproportionately large. This must be considered for computations of mortality rates in population studies.



Changes in length and weight of fed and starved northern anchovy larvae (Engraulis mordax) over time.

Analysis of 1978 and 1979 Larval Anchovy Surveys Completed

Lt. Commander Roger Hewitt, NOAA Corps, and Richard Methot, a former SIO graduate student now at the Bodega Bay Marine Laboratory, recently completed an analysis of several larval anchovy surveys conducted in 1978 and 1979. They noted that spawning in 1978 was contracted both spatially and temporally; spawning in 1979 extended over a larger geographic area and a longer period of time, and was displaced to the south. The contrast between 1978 and 1979 was somewhat offset by high spawning intensity during peak spawning activity in 1978; spawning in 1979 was less intense but sustained at a moderate level for a longer period of time. Anchovy larvae were 1.2 times as abundant in 1979 as 1978.

Early larval mortality (hatch to 20 days) was estimated to be slightly higher in 1978 than in 1979. Dispersal of larvae was evident during March, April, and May of both years. The production, mortality, and dispersal of larvae, on a monthly basis, was compared with the birthdate distribution of fish surviving to juvenile age.

Within each year, the number of surviving juveniles was positively and significantly correlated with larval production during their month of birth. Considerations of early mortality and adverse affects of dispersal contributed little to the correlation. Comparison between years was not possible.

Spawning success in the winter of 1978 was low relative to the spring of 1978; spawning success in the winter of 1979 was high relative to the spring of 1979. However, the large variations in recruitment often experienced by clupeoid stocks did not occur during these two years. The result emphasizes the need to understand the factors affecting the production of spawn and its distribution in time and space.

Manuscript Completed on Patchy Distribution of Larval Anchovy Prey

Dr. Robert Owen has completed a manuscript, "Microscale patchiness of small plankton on the Chimbote Shelf, Peru," which concerns differences in concentration of larval anchovy prey over very small depth intervals. Owen's work shows that larvae can encounter patches of high or low food density on vertical feeding excursions of less than 2 m. The presence of environmental gradients is not a necessary condition for such microscale patches--small patches were found in the absence of detectable changes in temperature, salinity and nutrient concentration in the layers sampled. Patchiness was also found to occur in the mixed layer under windy conditions, showing that surface stress does not necessarily cause microscale mixing of water.

COMMERCIAL AND RECREATIONAL FISHERIES RESEARCH FOR MANAGEMENT

Stauffer Presents Stock Assessment Lectures at CICIMAR

This month, Dr. Gary Stauffer, Fishery Biologist, presented a series of lectures at CICIMAR (Marine Science Institute), La Paz, Mexico, at the invitation of CICIMAR Director Daniel Lluch. CICIMAR and Scripps Insitution of Oceanography have set up a lecture series on fisheries and oceanography of the California Current Region, to run for the 80-81 school year. Stauffer's lectures concerned methods of biomass estimation for stock assessment. In the first lecture, he developed the catch equation from the exponential mortality model and discussed the use of catch and catch per effort to examine changes in stock abundance. The second lecture covered cohort analysis and introduction to fishery independent survey methods to estimating stock densities and size. Area swept method from bottom trawl surveys was discussed in detail, using examples from the sardine, anchovy, mackerel, tuna and hake resources to illustrate the discussions.

The lectures were attended by 40-60 students from CICIMAR and the local University. CICIMAR has about 40 undergraduate and graduate students in marine science. The research focus of the laboratory is the fisheries of Magdalena Bay. In the past 6 months, they have established a fishery

monitoring program for the bay and are planning a number of surveys for the bay and offshore waters. They also have compiled fishery catch and effort statistics for the last 7 years. The vessels are typical seiners, with catches composed of four major species including California sardines, Pacific mackerel, and two other clupeoid-like species. The laboratory and students have access to a new PRIME computer containing BASIC and FORTRAN languages, but need listings of classical computer programs used in fisheries analysis. Their library resources are limited and they would be grateful for donations of extra issues of journals that people are not using. In addition, Dr. Lluch would welcome further lectures on fishery stock assessment methodologies. Anyone interested should contact George Hemingway at SIO or Stauffer at SWFC, La Jolla Laboratory.

Rockfish Larvae Study Continues

In a continuing study of rockfish larvae, Fishery Biologist John MacGregor reports that analysis of the 14-year average numbers of collected larvae, by CalCOFI line, show high population levels in the San Francisco-Monterey area (lines 60, 63, 67). These three lines account for 33% of all rockfish larvae found in the survey area (30 lines, from 60 through 157).

Sparse data for the six lines north of line 60 (lines 40, 43, 47, 50, 53, and 57) indicate a population equal to about 75% of the population in the area represented by the six lines (60, 63, 67, 70, and 77). About a third of these larvae are found on line 57.

From Monterey (line 70), the larval population decreases southward to Point Conception (line 80). In the Channel Islands area (lines 83, 87, and 90) however, the larval population increases. These three lines account for 29% of the larvae found in the survey area. The number of larvae continues to decrease southward to line 157 with one smaller increase in the area of Cedros Island (lines 113-120).

The spawning season appears to be later farther south as shown by percent spawning for the five areas:

		Annual Percent Spawning	
	Lines	Jan.-Feb.	Mar.-Apr.
No. California	60-77	58	22
So. California	80-93	45	23
Baja California	97-107	32	38
	110-120	31	47
	123-137	11	51

April is the peak spawning month for the last three areas in the above table. Because these areas account for only 17% of the total average yearly spawning in contrast to 82% for the first two areas, this phenomenon tends to be masked. This increase in late spawning in the more southerly areas is

probably due to the increase in the proportion of late-spawning rockfishes of the subgenus, Sebastomus, which become relatively more abundant in the southern range of the rockfishes.

Huppert Presents Paper at Workshop on Economic Analysis in Fishery Management Plans

Dr. Daniel Huppert, Task Leader, presented a paper entitled "Economic Analysis for Northern Anchovy Management" at the Fishery Management Plan (FMP) workshop in Newark, Delaware, on November 6. Using the anchovy fishery management plan as an example, the paper discusses the use of economic analysis in five key areas:

1. Evaluation of aggregate harvest rates,
2. Allocation of fish harvests among various end uses,
3. Optimum level of investment in harvesting and processing capacity,
4. Formulation of regulations to achieve desired levels of catch and investment, and
5. Design of management information and monitoring programs.

Under each of these subject areas, the accomplishments of the anchovy FMP were summarized, specific shortcomings were reviewed, and occasional critical comments were directed toward the broader problems inherent in the economic theory of fisheries.

Other papers presented at the workshop addressed fishery management issues in the Gulf Shrimp Plan, the Surf Clam Plan, and the Pacific Salmon Plan. More general issues were raised by papers on multi-objective management plans, recreational fishery management problems, regulatory analysis and fisheries development problems. Lee Anderson, the workshop organizer, plans to publish the collected papers from the workshop through Ann Arbor Press.

Aerial Marine Resource Monitoring System Updated

Susan Iacometti, Computer Programmer, reports that the Aerial Marine Resource Monitoring System (AMRMS) data base has been brought almost up-to-date, eliminating most of the back-up due to the lack of a computer programmer during FY 1980. Iacometti also completed an edit and summary of the sighting data on six species of pelagic fish for 1962-1976 for Fishery Biologist Jim Squire.

Center Scientists Participate in 40- Day Cruise to Study Black Cod Resources

On November 23, the NOAA/research vessel, Chapman, completed a 40-day study of the black cod or sablefish (Anoplopoma fimbria) resources off the central and southern California coast. SWFC's Dr. Gary Stauffer (La Jolla Laboratory) and Richard Parrish (Monterey - PEG) participated in the cooperative cruise, which was conducted by the NMFS Northwest and Alaska

Fisheries Center, the California Department of Fish and Game, and the University of California's Scripps Institution of Oceanography. The objectives of the cruise were to conduct a trap survey to establish baseline data on the black cod resource, and to test the effectiveness of escape rings in rectangular and conical traps in reducing catches of undersized fish.

The primary survey locations were the Patton Escarpment off the San Diego coast, and the Farallon Island area off San Francisco. In addition to testing trap effectiveness, the crew also carried out an extensive tagging program to learn more about black cod migration patterns. Tissue samples were also collected from some of the captured fishes for biochemical studies to determine stock composition and degree of coastwide genetic mixing. (See pages 18-23 for photo story on cruise.)

SURVEY SYSTEMS DEVELOPMENT AND EVALUATION

Peruvian Anchovetta Biomass Assessment Plan Proposed

The Peruvian Marine Institute (IMARPE), in cooperation with the Peruvian-German Cooperative Program (PROCOPA) and the Southwest Fisheries Center, were the agencies responsible for a weeklong workshop on spawning biomass assessments on anchovy and sardine using the egg- production method. Participants in the workshop, led by Dr. Paul Smith, Fishery Biologist, SWFC, inluded Dr. Haydee Santander of the IMARPE basic science program, Dr. Isabelle Tsukayama of the IMARPE population dynamics program, and Dr. Jurgen Alheit, biologist for the ichthyoplankton section of the PROCOPA project. A paper has been drafted for publication by IMARPE on the sample probability distribution of Peruvian anchovetta eggs from vertical tows by Hensen nets taken since 1966. The paper recommends that 600 sample surveys be conducted for monitoring the absolute spawning biomass of Peruvian anchovetta. The first recommended survey is for August 1981 using the Humboldt, a Peruvian research trawler, followed by a second survey from the 25-ship Eureka survey in September 1981.

A second paper is being drafted to compare the Peruvian anchovetta egg sample probability distribtion and the California anchovy egg distribution. The Coastal Division, SWFC, has developed and tested the egg production method extensively since 1978. The major advantages of the method are that it is absolute, direct, instantaneous, and each parameter used can be evaluated for contribution to overall precision. The larval census method has been in use since 1951 but the major assumption of constant embryronic mortality and, particularly, constant spawning frequency, cannot be tested with the larval method. The larval census method has generally been accepted as an appropriate way of measuring large, long-term population changes, but it may prove inadequate for annual management quotas which require high precision when the population is near the moratorium limit of 1 million tons of spawning biomass.

1. Captain Warren Taguchi of the R/V Chapman. Captain Taguchi served a tour of duty at the La Jolla Laboratory from 1973 to 1975. He was the first NOAA Officer ever assigned to the SWFC.

2. Bait-grinder used to chop blocks of frozen Pacific herring. The chopped herring served as bait for the sablefish traps.

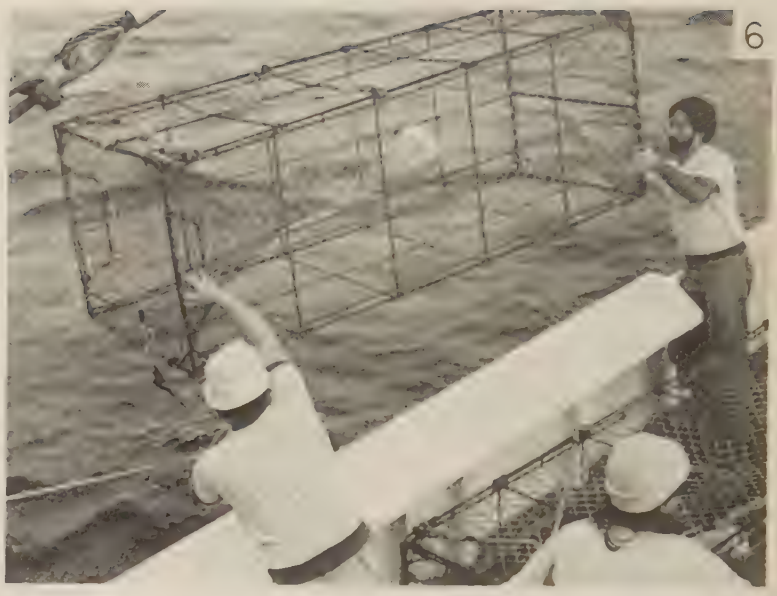
(Pictures 3-11 follow, in sequence, the major steps in catching and tagging sablefish or black cod.)

3. The flag, floats, and buoyline marking the start of the set for sablefish, are lowered into the water.

4. Feeding out 550 fathoms of groundline (in bucket) through the line hauler. Steve Hughes (top), NWAFC, Seattle, Chief Scientist of the first leg of the cruise, holds a trap gangion in his hand. The gangion will attach a trap to the groundline.

5

6



7

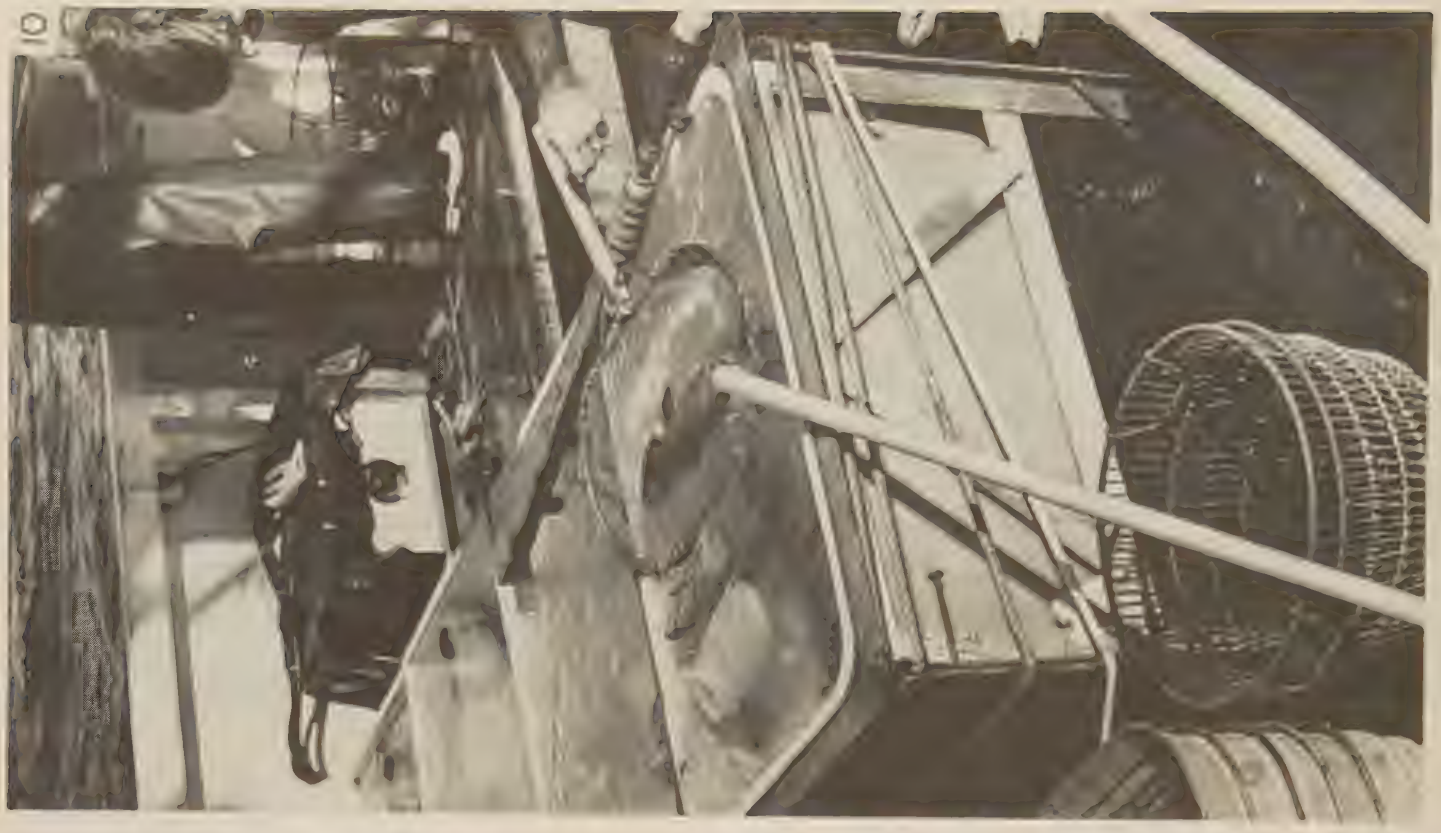
8

5. Steve Hughes connects the brummel hooks of the trap bridle to a gangion which will hold the trap to the groundline. This is one of 10 traps (or pots) which will be attached to the groundline between two anchors.

6. Steve Hughes (left) and Frank Shaw, NWAFC, Seattle, toss a trap overboard. In its center, the rectangular trap has a perforated plastic jar containing 2 lbs. of chopped Pacific herring as bait. The tunnel through which the fish must swim to reach the bait, and which blocks the fish's exit from the trap, can be seen on the left side of the trap.

7. The last of two groundline anchors is tossed overboard. These anchors hold the groundline on the ocean floor so that the 10 traps attached to the line between them will not become tangled.

8. Steve Hughes and Chapman Bosun retrieve a sablefish trap. The trap was fished for 24 hours but few sablefish were caught (see lower end of trap).



10

9

11

9. Sablefish are transferred by net to a live tank.

10. A series of four live tanks were used on the Chapman to hold the fish.

11. Kathy Edwards (facing camera), NOAA Corps Officer, NWAFC, holds a sablefish while Kathy Sullivan (back to camera, right), SIO graduate student, tags it. Dr. Murray Hayes, NWAFC, records data on the fish's length and tag number.

For the first year of the Peruvian anchovetta biomass estimate, it is proposed that the anchovetta and sardine gonad samples be processed at the Southwest Fisheries Center. This would permit training of Peruvian scientists and maintaining histological standard techniques. Procedural training at sea is proposed for the scientists involved, at SWFC in April and for the Peruvian technicians in Callao in early August 1981. Data processing protocols will be established between April and August 1981 and implemented on the PROCOPA computer system in September 1981.

Little Variation Found Between Replicate Tows for Anchovy Eggs at 1979 Stations

Fishery Biologist Paul Smith reports that analyses of the sources of variance of the egg production per unit surface area has begun, using the eight replicate tows done at each station in 1979. Analysis of the test set of 68 stations supports the hypothesis that within-station variance for 70 meter vertical tows is an insignificant proportion of the between-station variance for eggs 1,2,3, and 4 days old, and for 2.50, 3.75 and 4.75 mm larvae. The "F" ratio ranged from 0.06 to 0.85 for all seven stages analyzed. The fact that within-station variance is neglible means that single tows can be accepted as representative. It appears likely that the scale of pattern of anchovy eggs and larvae is of the order of 1000 meters, and probably results from the scales of size and motion characteristic of the spawning portions of anchovy schools. The sample means of 68 odd-numbered tows and their average, (a), and 68 even-numbered tows and their average, (b), for each of 6 stages of the embryonic portion, of the life history (ca. 10 days), are shown in Figures 1a and 1b on the next page.

Oceanic Fisheries Resources Division

TUNA/BILLFISH RESOURCES PROGRAM

Preliminary Report of Skipjack Tagging Cruise Presented to ICCAT

A report, "Preliminary Results of a 1980 Skipjack Tuna Tagging Cruise in the Western Atlantic and Caribbean Sea" has been prepared by Fishery Biologist Ronald G. Rinaldo, Oceanographer Richard H. Evans of the La Jolla Laboratory, and Biologist Philippe J. Vergne of Living Marine Resources, Inc. The report, prepared for the Standing Committee on Research and Statistics (SCRS) meeting of the International Commission for the Conservation of Atlantic Tunas (ICCAT) November 3 to 11, 1980, in Madrid, Spain, presents results of a baitboat tagging cruise conducted from February 4 to April 18, 1980, in the western

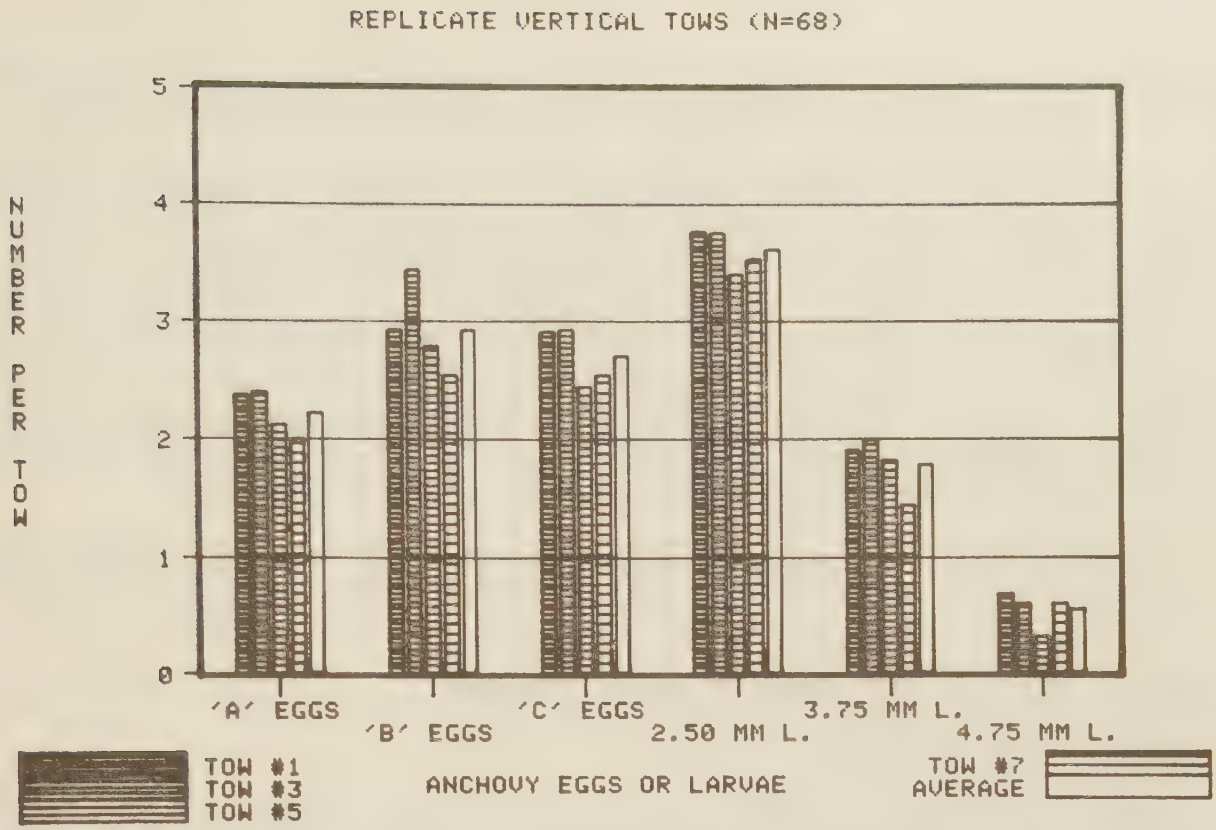


Figure 1a. Sample means of 68 odd-numbered tows and their average (a).

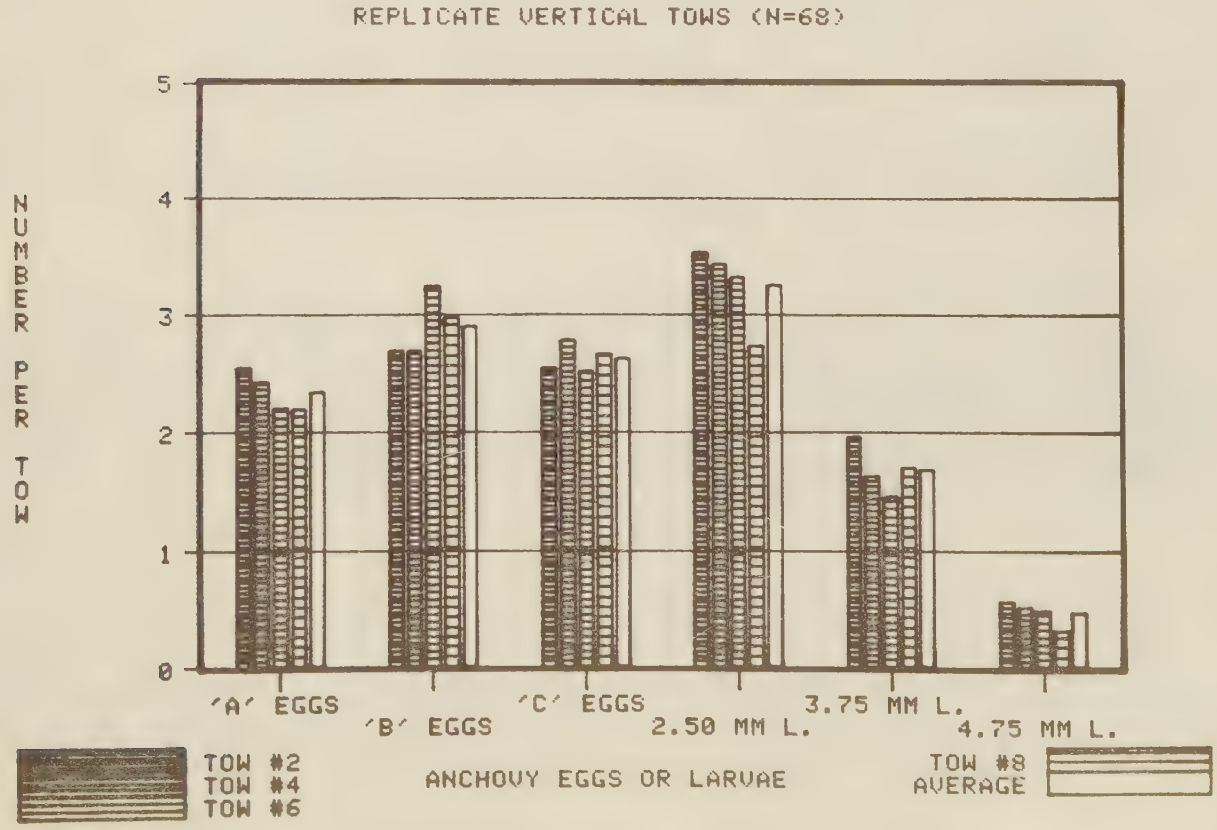


Figure 1b. Sample means of 68 even-numbered tows and their average (b).

Atlantic between the Dominican Republic and the coast of Surinam. The cruise was a U.S. contribtuion to the International Skipjack year program of ICCAT.

One hundred forty-three schools of tuna/tuna-like fish were sighted during 54 days on the fishing grounds. Of the schools sighted, 36.4% were skipjack tuna. The total fish tagged with dart tags numbered 1,612. Skipjack tuna accounted for 1,412 of the tagged fish: 1,074 single-tagged, 121 double-tagged, and 217 tagged and injected with tetracycline. Fish tagged from 15 schools accounted for 93.7% of all tagged fish. Morning fishing was generally unsuccessful, resulting in fewer than 10 fish being tagged from each school stopped. Schools stopped between 5 and 7 p.m. accounted for 70.4% of the fish tagged. Biological samples were taken from 39 skipjack tuna and 12 other species. Records and data on baitfish were also reported. Environmental observations were made in conjunction with all cruise activities.

To date, five tags have been recovered: three (3) from the Caribbean off Venezuela, one (1) from off Puerto Rico and one (1) from the Martinque area.

Status of Atlantic Tuna Sampling Programs Reported

U.S. Tuna Purse Seiners:

As of November 27, 1980, six of the U.S. purse seiners fishing in the Atlantic Ocean during 1980 had unloaded their tuna catches in Puerto Rico. These catches were sampled for size composition. The number of samples are as follows:

Species	Vessels sampled	# of samples	# of fish sampled
Yellowfin	6	15	679
Skipja	6	14	700
Bigeye	4	7	232

Foreign Transshipments:

Foreign-caught Atlantic tunas that are transshipped to Puerto Rico continue to be sampled for size and species composition by Eugene Holzapfel, Biological Technician, stationed in Mayaguez, Puerto Rico. Samples are from catches of baitboats, purse seiners and longliners fishing under Korean, Panamanian, Ghanian, Japanese, Spanish, and French flags.

Results of sampling during the period January-November 1980 are as follows:

Species	Gear	No. of samples	No. of fish sampled	sampled (MT)
Yellowfin	Baitboat	31	1835	425.04
	Purse seine	6	446	1263.44
	Unknown	-	-	-
Skipjack	Baitboat	20	1009	3473.98
	Purse seine	11	653	3701.24
	Unknown (LL)	1	50	1.61
Bigeye	Baitboat	16	761	117.24
	Purse seine	2	86	43.35
	Unknown	-	-	-
Albacore	Longline	8	390	2403.61
Total		95	5230.	11,429.51

Status of Atlantic Tuna and Billfish Stocks Assessed by ICCAT

Fishery Biologists Drs. Gary Sakagawa, Wesley Parks, Norm Bartoo, and Oceanographer Richard Evans, attended the 1980 meeting of the International Commission for the Conservation of Atlantic Tunas (ICCAT) Standing Committee on Research and Statistics (SCRS) held in Madrid, Spain, November 6-12. The scientists prepared status of stock reports on Atlantic tuna and billfish stocks to assist the Commission in identifying needed conservation measures. Reports on the multi-species aspects of fisheries for both temperate and tropical Atlantic tuna species were also prepared. Multi-species interaction, especially with regard to tropical species, will demand an increasing proportion of scientific attention in the future.

The SCRS appraisal of stocks of yellowfin, Atlantic skipjack, and Atlantic bluefin tunas remains unchanged from that in 1979. On an Atlantic-wide basis, yellowfin appear to be heavily exploited at levels near Maximum Sustainable Yield (MSY). Considered separately, yellowfin in the eastern Atlantic are fished near MSY while yellowfin in the western Atlantic are underexploited. Atlantic skipjack stocks appear to be exploited at a high level in tne eastern Atlantic. However, the relationship of recent catches to MSY is unknown since it has not yet been possible to estimate the potential yield of the stock.

The abundance of adult and very large Atlantic bluefin is forecast to decrease over time, given current effort levels. In addition, both the northern and southern albacore stocks are being fished somewhat below MSY, as are the Atlantic bigeye tuna stocks, but increased effort would probably result in only marginal increases in yield of the latter. Reports on billfish

show that catch-and-catch-per-unit effort (CPUE) continue to decline for blue marlin, white marlin, and sailfish. The exact status of these stocks is unknown, and the general lack of data on swordfish precludes any firm decisions on stock status at this time.

The SCRS did not recommend any new management actions for the conservation of Atlantic tuna and billfish stocks at its 1980 meeting. However, it did recommend that Atlantic billfish stocks be monitored more closely, and additional data necessary to analyze the multi-species aspects of tuna fishery managment be collected.

Giant Sea Bass Recovered Near Tagging Spot After Seven Years

Fishery Biologist Jim Squire reported that a giant California black sea bass, weighing 225 lbs., was caught recently within two miles of the area in which it was initially tagged seven years ago--one of the longest stretches of time on record for a recovery. The fish was tagged off the coast of Anacapa Island, at the eastern end of the Channel Islands near the southern California coast, during a tagging program initiated to learn more about the movements of these large gamefishes. Giant black sea bass are common off the coast of southern California and Mexico. They reach weights in excess of 500 lbs. and can live to be 70 years old or more.

The tagging program was started in the early 1970's by the Greater Los Angeles Council of Divers (GLACD), in cooperation with NMFS and the California Department of Fish and Game. Two goals of the program were to find out if the giant black sea bass migrated long distances and to determine the effects of heavy fishing on this popular gamefish. Whenever a tagged fish was recovered, information such as date and location of catch, and a description of the fish, was sent to the SWFC. To date, 7 of the 18 sea bass tagged by GLACD (39%) have been caught. Most of these have been recovered near Anacapa Island.

MARINE MAMMAL BIOLOGY AND TECHNOLOGY PROGRAM

Unusual Whale Strands on Beach in La Jolla

On the morning of November 20, a Cuvier's beaked whale, Ziphius cavirostris, came ashore in La Jolla, approximately 800 meters north of the Southwest Fisheries Center's La Jolla Laboratory. The whale, a male 526 cm (a little over 17 ft.) in length, was too large to be transported, and hence was examined and flensed at the stranding site by a team of biologists and technicians from Southwest Fisheries Center and Hubbs-Sea World Research Institute. The skeleton and all internal organs were saved and returned to the laboratory for further preparation and examination.

Figure 1. Cuvier's beaked whale (Ziphius cavirostris), which washed ashore near Black's Beach, La Jolla, on November 20. The white scars on the animal result from bites of a small shark, Isistius sp. Student Intern Jeff Kelly holds the field number (JRH-087) assigned to the whale.

Figuer 2. SWFC staff, including Tom Gronholt (left) and Doug DeMaster (front center), roll the whale onto its belly to facilitate measurements. Long scratches on the animal's back result from tooth racking by other males. A clump of epizootic barnacles are seen on the tip of the lower jaw.

The following day, Biological Technician Larry Hansen, Student Intern Steve Storch of the La Jolla Laboratory, and marine mammal veterinarian Dr. Jay Sweeney, a private consultant, examined the viscera to assess disease and/or parasite damage which may have caused the animal's death. The most striking finding was an infestation throughout the kidneys of large (up to 1 meter long, 5 mm diameter) nematode worms. These parasites branched out throughout the renal tubules and urine collecting ducts, and were associated with numerous cysts. The scientists believe that the affliction most likely severely impaired kidney function and contributed to the animal's death.

This species of beaked whale ranges throughout all temperate and tropical seas, yet is rarely seen or recognized, and even then, usually only by experienced observers. It is thought to inhabit deep, offshore waters and seldom strands. The most recent previous occurrence of a Ziphius stranding in southern California was in 1977.

Pacific White-sided Dolphins Under Study

Dr. William Perrin, Task Leader, reported that, as part of a continuing effort to develop information on populations of coastal marine mammals, the SWFC let a contract to the Hubbs/Seaworld Research Institute (H-SWRI) in August 1979 for study of the Pacific white-sided dolphin, Lagenorhynchus obliquidens, in the northeastern Pacific. Principal investigators on the project will be Steve Leatherwood and William A. Walker. The first phase of the work is due for completion in May 1981. To date, a 200-item bibliography has been compiled, all available published and unpublished sightings and effort information has been compiled, and all available morphological data (for study of geographical variation and stock structure), teeth (for age determination), reproductive data and specimens, and stomach contents have been gathered and cataloged for 296 specimens (about 100 more than originally estimated to be available) in the possession of 22 museums and other institutions. The search for specimens and data will continue until the end of December 1980.

In the second phase of the contract work, to begin in spring of 1981, H-SWRI, in collaboration with SWFC, will carry out appropriate analyses and prepare a technical report on morphological differentiation of stocks and on growth, reproduction, population structure and feeding ecology. Perrin, Leader of the Marine Mammal Biology and Technology Program, is supervising the technical supervisor for the contract.

Work Proceeds on Reevaluation of Age for Dolphin Subsamples

Dr. Al C. Myrick, Leader of the Marine Mammal Age Determination Project, reports that approximately 200 of the selected 1600 teeth of northern offshore spotted dolphins, Stenella attenuata (chosen at random for reevaluation of age) have been processed and read. A rapid decalcification and staining technique has been developed by Biological Technician Priscilla Sloan that

uses body length and pulp cavity volume as an index for decalcification time. This technique has reduced considerably the time required to produce high quality sections.

This new method of reading teeth is based on data obtained from Myrick's study of layering rates using teeth of tetracycline-marked Hawaiian spinner dolphins, Stenella longirostris, a project which is just concluding. Under the new reading method, untreated and decalcified and stained teeth of each specimen are read three times, using dentinal and cemental layers and without reference to any accompanying data. With few exceptions, the method has achieved high repeatability of layer counts.

The completion date for processing and reading all 1600 teeth is expected to be early spring, at which time Myrick will begin similar work on a large random subsample of spinner dolphin teeth.

Method of Reading Tooth Layers in Pacific White-sided Dolphins Being Developed to Aid Researcher in Species Studies Here

Kimberly Goodrich, researcher for Hubbs-Sea World Research Institute (H-SWRI), underwent training in tooth preparation recently at the Marine Mammal Age Determination Lab. She is now processing specimens of the Pacific white-sided dolphin, Lagenorhynchus obliquidens, preparatory to aging the sample in conjunction with the species study contracted to H-SWRI by SWFC. According to Dr. Myrick, who is tutoring Goodrich, the layering pattern in teeth of these specimens resembles that of Hawaiian spinner dolphins, for which layering rates are known. As work proceeds, further comparisons in layering patterns are to be made. If the correlation can be verified, it may be possible to age the sample using real-time interpretations of layers.

Age Determination Study for Florida Manatees Nears Completion

Acting on a request by the U.S. Fish and Wildlife Service's Manatee Management Program, Dr. Myrick and Jeff Kelly, student intern from South Hampton College, have begun a short study to develop a method to determine age of Florida manatees. An ontogenetic sample of periotic bones and mandibles representing five males and seven females was prepared by decalcification and staining after the bone histology was examined in various anatomical planes. Presumptive yearly and monthly layers were easily discerned in decalcified and stained thin sections of the periotics, but a considerable amount of resorption of layers was formed in the mandibular sections from the adult animals. A paper describing the manatee aging research and recommending the use of periotic bones as the layering site is being prepared by Myrick and Kelly.

Materials for Fabricating Dolphin Disc Tags Being Examined

Fishery Biologist Jacqueline Jennings and Fishery Technician Ray Stives attended the Western Plastics Exposition in Anaheim, California, and met with

D. LeQuin and her staff of the Nonmetallic Materials Division, Naval Surface Weapons Lab, to resolve problems with the production of dolphin disc tags. LeQuin has analyzed the problems with the earlier SWFC disc tags and prepared new prototypes of polyurethane and Delrin. Further modifications to the mold and tag design have been developed, and tests for UV stability of the pigments and materials are being carried out. The work should be completed by March 1981.

Modification of Satellite-linked Transmitter for Dolphins in Progress

The satellite-linked transmitter for dolphins is being modified in order to increase the power output and expose the antenna for longer periods of time. Preliminary tests of the antenna patterns are encouraging and prepartion for preliminary tests of simulated dolphin surfacings has begun. J. Jennings and R. Stives met with personnel from Scripps Institution of Oceanography to design test gear and to arrange to use their 90,000-gallon tow tank. A rotating counter-balanced arm will be constructed to bring the transmitter through an arc as it surfaces and descends. The surfacings will be about 1 second in duration. Salt water will replace the fresh water in the tank because salt water is needed to trigger the switch. These tests will be conducted in early January prior to a test with a wild dolphin in Hawaii.

MARINE MAMMAL ASSESSMENT AND MONITORING PROGRAM

IATTC/ SWFC Photographic Survey Continues

A joint Inter-American Tropical Tuna Commission (IATTC)-SWFC aerial photographic study aimed at estimating lengths of porpoise is underway off the west coast of Mexico, despite a mechanical breakdown that delayed work for about 2 weeks. Participating in the study from the La Jolla Laboratory are LCDR Wayne Perryman and Fishery Biologist Frank Ralston. Perryman reports that photographic conditions and photographs so far have been extremely good, with much better resolution than has been previously obtained. The field portion of the study is planned to be completed in mid-December after which the photographs will be studied and evaluated by IATTC and SWFC scientists.

DeMaster to Head Coastal Marine Mammal Project

Dr. Doug DeMaster, Wildlife Biologist, has been assigned to head the Coastal Marine Mammal Research Project at the La Jolla Laboratory. His new duties include designing, planning and conducting research on the biology of coastal marine mammals of California and coordinating cooperative research projects on coastal marine mammals with other organizations. DeMaster has had extensive experience in research on pinnipeds, having studied the population dynamics of the Wedell seal in McMurdo Sound, Antarctica, for his doctoral research. Before coming to SWFC, DeMaster also directed the polar bear/walrus project of the National Fish and Wildlife Laboratory for the U.S. Fish and Wildlife Service.

TIBURON LABORATORY

FISH COMMUNITIES INVESTIGATION

Shortbelly Rockfish Biology Study Continues

Cruise Leader Tony Chess and other members of the Predator-Prey, and Rockfish Analysis Tasks, continued study of the shortbelly rockfish Sebastes jordani, working this month off central California aboard the NOAA research vessel, David Starr Jordan. Despite major equipment failures, they were still able to collect samples to define the food habits of this species, and to determine its diel patterns of distribution and that of the zooplankton on which it feeds. The work is part of a continuing investigation of seasonal trends in shortbelly rockfish biology.

Sixteen bottom and midwater trawl hauls, and 12 stratified and oblique Tucker net plankton hauls, were made during the day and night (see photo, next page). All collections were made at either of two previously established study areas, one off Ano Nuevo Island near the head of Ascencion Canyon (37° 00'N, 122° 25'W), and the other off San Gregorio near the head of Pioneer Canyon (37° 18'N, 122° 52'W). Seventy shortbelly guts collected before first morning light and before dusk were preserved for laboratory analysis. An additional 270 shortbellies were sampled for ototliths, size frequency, and gonad development.

In addition to the stratified Tucker net hauls taken midday and midnight, four oblique hauls were made near midnight at stations 0, 2, 4, and 6 miles northwest of Ascencion Canyon, to determine the distribution and density of euphausiid species away from submarine canyons. Although more sampling is needed, cursory examination of the collections indicates that these important prey species may be significantly more abundant near the canyons and in those areas where shortbelly rockfish appear to aggregate.

Biological Information Collected on Other Rockfish Species

Earlier in the month, Fishery Biologist Tina Echeverria of the Rockfish Analysis Task was aboard the David Starr Jordan to collect information on other rockfish species. Hook-and-line was used to take specimens between San Clemente Island and Point Sur. A total of 414 individuals was taken, of which 140 were useful for morphometric studies. The data collected were sufficient to complete the coverage of several species.

Preparations for Widow Rockfish Workshop Near Completion

Dr. William H. Lenarz, Leader of the Rockfish Analysis Task, reports that preparations are nearly complete for the Widow Rockfish Workshop that will be

Figure 1. A Tucker plankton net being deployed by Tiburon biologists (left to right) Dan Howard, Mike Bowers and Dana Tryde. The special design of this net permits catch to be limited to specific depths and periods of time.

held at the Tiburon Laboratory, December 11-12, 1980. About 35 participants will attend the 2 sessions, at which 16 papers will be presented. There will also be a discussion panel composed of members of the fishing industry and the Groundfish Management Plan Development Team of the Pacific Fishery Management Council. Discussion topics will include research needs, current status of the fishery, future status of the fishery, and how these items fit in with other groundfish fisheries and research. Talks will be presented at the workshop by Dr. Lenarz and Tina Echeverria of the Rockfish Analysis Task, Candis Cooperrider of California State University, San Francisco (under contract to the Task), and Peter Adams of the Predator-Prey Task. The talks will later be published as a collection of papers, and will be co-edited by Dr. Lenarz and Dr. Donald Gunderson, University of Washington.

FISHERIES DEVELOPMENT INVESTIGATION

Research Cruises Planned to Explore Possibility of Expansion of California Trawl Fisheries

Charter bid requests for two up-coming cruises are being solicited from commercial trawlers. Fishery Biologist Sus Kato and Lt. Patrick Rutten, NOAA Corps, will participate in the first cruise during January 1981. This charter will fish in deep waters off south-central California to learn if commercial quantities of fish are available during the winter, when fresh fish are generally scarce. Principal target species are Dover sole, blackgill rockfish, channel rockfish, and California king crab. The second cruise will take place in late January or early February, near Monterey, California. The chief objetive of the second cruise will be to obtain large quantities of shortbelly rockfish for market evaluation. Gear selectivity will also be tested to learn if "semi-pelagic" trawls can be as effective as midwater trawls in catching only shortbelly rockfish.

Fishing of Shortbelly Rockfish for Export to Japan Continues

Fishery Biologist William Leet accompanied the trawler, San Giovanni II, on a fishing trip off Monterey, California, on November 2, 1980. Owner/Captain Joe Pennisi tested his newly constructed midwater trawl, which was equipped with the laboratory's net monitor. Various equipment failures occurred during the shakedown, each revealing adjustments which had to be made. No schools of shortbelly rockfish, the target species, were encountered on the trip, but on a subsequent trip, Captain Pennisi caught about 5,000 pounds of shortbelly rockfish which were packed and frozen for a Japanese customer. The target amount for preliminary sales analysis in Japan is 40 tons of fish by the end of the year. About half that amount is also required for experimental use by a domestic pet food manufacturer. The Laboratory staff will continue to work with Captain Pennisi and others to help insure delivery of the fish.

Fishermen and Researchers Interested in Development of Octopus Fishery

Interest continues to be high for development of an octopus fishery, as evidenced by calls and visits by fishermen and researchers from both the north and south coasts. Lieutenant Patrick Rutten (NOAA Corps) and Fishery Aid Susan Pollock are building traps which will be used in cooperative studies with fishermen, and are experimenting with ways of upgrading the product. A front-loading washing machine was modified for tenderizing octopus for the Japanese market. In the first test, three dead octopus weighing 6-11 kg were placed in the machine for three hours. The product was tenderized, but appearance of the octopus was judged unacceptable. The machine will be further modified to lower the number of revolutions per minute, which should reduce damage to the octopus skin. Weight loss during the tenderizing and cooking process was considerable, averaging about 63 percent of the live weight. This may explain why Octopus defleini is not particularly desired by the Japanese market, and may preclude entrance into that market.

Joint United States/Japan Meeting on Protein Resources Held

On November 25, Sus Kato, Supervisory Fishery Biologist, attended a session at Albany, California, of the Joint Panel Meeting on Protein Resources, sponsored by UJNR (a United States/Japan cooperative study group) at the Western Regional Research Center of the Department of Agriculture. The topics of chief interest were two papers presented by Dr. Minoru Okada, a prominent Japanese biochemist who specializes in "kamaboko" (fishcake products). One paper addressed the problems in utilizing dark-meat fish in kamaboko, and the second paper described recent advances in the use of krill as food. The texts of these talks are available at the Tiburon Laboratory.

PHYSIOLOGICAL ECOLOGY INVESTIGATION

Manuscript Accepted for Publication in Proceedings of Gulf and Caribbean Fisheries Institute Meeting

Due to unfortunate circumstances, the paper, "Physiologic responses of striped bass (Morone saxatilis) embryos and larvae to low, sublethal concentrations of the aromatic hydrocarbon benzene," by Maxwell B. Eldridge, Pete Benville, and Jeannette A. Whipple, was not presented as scheduled at the Gulf and Caribbean Fisheries Institute Meeting early in November. The manuscript, however, was accepted for publication in the proceedings and will be published in the Spring of 1981. The paper describes a multi-disciplinary study of how much C^{14} benzene striped bass embryos, pre-feeding larvae, and feeding larvae absorbed, accumulated, and depurated (cleansed from their bodies) during their respective early life stages. Affects of the high accumulations were reflected in embryonic and larval survival growth, and metabolism. The paper also describes these responses and their potential implications. Of particular note is the fact that early life stages bio-

accumulated benzene to high degrees (up to 1,400 times exposure concentration) and demonstrated direct as well as delayed affects.

Study of Histopathological Effects of Benzene on Striped Bass Juveniles Continues

An experiment to determine the histopathological effects of high, medium, and low sublethal concentrations of benzene on striped bass young-of-the-year juveniles continued throughout November. A new continuous-flow exposure system utilizing a syringe pump, mixing column, and metered delivery system closely maintained concentrations near desired levels. Aqueous benzene concentrations averaged 3.9, 1.4, and 0.31 ppm during a two-week exposure period. No mortalities resulted from exposure, but feeding behavior was modified in fish exposed to high benzene concentrations. Fish were sampled at different times during the exposure and depuration periods, specifically for histological study. Sagittal and cross sections of replicate samples are being taken to determine what changes take place in target and non-target tissues.

SOUTHWEST REGIONAL DATA MANAGEMENT AND ADP OPERATIONS

PACES Updated for Transfer to SWR Office

This month, Computer Programmer Robert Butler continued to refine and update the general documentation for the Pacific Area Cooperative Enforcement System (PACES). He also reviewed PACES with John Davies, the Computer Specialist at the Southwest Region, who will be the new data manager for PACES. To orient himself on the operations of PACES, Davies will monitor the daily usage by the field enforcement officers, and will study the PACES file structure and the command language of the host computer on which PACES resides during the transition period for the transfer of PACES to the SWR office.

SPREDX Used as Management Tool by Honolulu Laboratory

Oden Burris, Computer Programmer, assisted Richard Uchida, Supervisory Fishery Biologist from the Honolulu Laboratory, in use of Computer Sciences Corporation's utility program, SPREDX. With line items fed in by the user, the program plots a PERT chart, which diagrams the activity-event network. PERT shows graphically, before the project begins, the component tasks, their interrelationships, and the sequence they must follow to reach the desired objective. Uchida used SPREDX as a management tool for planning the Central and Western Pacific Survey (Northern Marianas) project.

Committee for Joint Procedure of Mini-Computer Systems Meets

Systems Analyst Dorothy Roll traveled to Washington, D.C., on November 4 for a 3-day meeting with Hoyt Wheeland and Fred Brooks from Headquarters, Darrell Tidwell and John Houghton from the Southeast Region, and Gene Heyerdahl from the Northeast Region. All serve as technical members of the committee for the joint procurement of the mini-computer systems for the SWC, SEC and NEC. The purposes of the meeting were to review the status of the requirement studies; coordinate the procurement action; and to produce a milestone chart showing products and time frames. The group met with officials from the NOAA ADP Planning and Management Office and the DOC ADP Management Office for guidance in the required procedures for the committee to follow in order to assure NOAA's and DOC's acceptance of the Request for Proposal (RFP) in the most timely manner.

Security Officers for ADP Installations Listed

To comply with the regulations of DOC's ADP Security Manual, the Department of Commerce has requested that SWFC provide a list of all ADP installations and their security officers. The security officers are designated to ensure that appropriate security measures are taken to protect

both data and ADP equipment. An installation is defined as a specific unit, such as a communication terminal. For the Southwest the following security officers have been assigned:

ADP Operations	Mark Sullivan/Robert Butler
NOAA ship DAVID STARR JORDAN	Mark Sullivan/Don Smith
Oceanic Division	Al Coan
Coastal Division	Richard Charter
Honolulu Laboratory	George Liao
Tiburon Laboratory	Nancy Wiley
Pacific Environmental Group	Douglas McLain
Southwest Region	John Davies

Orion System on JORDAN Used on CalCOFI Cruises

Lt. Mark Sullivan, NOAA Corps, on assignment to Fred Kellenberger, SWFC Data Systems Manager, reported that the ship-board Oceanographic Research Integrative Onboard Network (ORION) system aboard the David Starr Jordan was put into standard operational use on CalCOFI cruises 8010 and 8012. Personnel from the SWFC and the Jordan completed the half-day operators training course, and several personnel became proficient in programming the off-line software of the system. Work continued at the Pacific Marine Center, Seattle, for automatic accessing of the Jordan hydrographics winch data for plankton net tows. Work also continued on the North Star micro computer system, and some progress was made in patching the system operating software to allow interaction through a DC 212A modem in order to communicate with time share systems.

* * * * * * * * * *

A computer users group meeting was held on November 3 at the La Jolla Laboratory. Data Systems Manager Fred Kellenberger presented a number of movies showing the multiple capabilities of computer graphics, and Bob Lapsley, Computer Science Corporation, discussed the capability of the graphic software package, DISPLAY. The next group meeting will be held in January when specific graphics applications will be presented by the Center's computer specialists.

MISCELLANEOUS

PUBLIC AFFAIRS

La Jolla Laboratory

Dr. Reuben Lasker, Chief of the Coastal Fisheries Resources Division, reviewed the work of the Southwest Fisheries Center for a visiting class from Mesa College, San Diego, on November 25. The students in the class on Oceanographic Techniques were accompanied by their instructor, Charles Jerde, who has brought a class to the SWFC annually for the past 3 years.

Tiburon Laboratory

On November 12, 40 members of the California Academy of Sciences visited the Tiburon Laboratory, and were given an explanation of the Laboratory's activities by Laboratory Director Norman J. Abramson. William Davoren, U.S. Fish and Wildlife Service, also spoke to the group on San Francisco Bay problems. After these talks, the CAS members received a tour of the San Francisco Tyee Club's salmon pens and the laboratory's Physiology Building.

On November 19, Laboratory Librarian Maureen Woods led a group of 27 seventh grade students from Kent Middle School, Kentfield, California, on a tour of the Tiburon Laboratory. Each of the students was given the opportunity to study some aspect of marine biology. The tour began with a look at an otolith through a microscope and a view of a fish scale in the microfiche reader. Director Norman Abramson explained how scales and otoliths are read to determine the age of a fish. The students were also given a tour of the physiology laboratory by Fishery Biologists Maxwell Eldridge and Pete Benville. The pollution research program was explained by Eldridge, and the students were shown how various items of equipment are operated. Benville took them through the chemistry laboratory and demonstrated the use of the gas chromatograph.

SEMINARS

La Jolla Laboratory

November 5 - Dr. Bill Gazey, Institute of Resource Ecology, University of British Columbia, gave a seminar on the "Deriso model: Applications, parameters, estimation, and validity. (Age structured exploitation model of a fish population-GHT)."

November 14 - Dr. Colin Barnett, National Research Council/NOAA, SWFC, gave a talk entitled, "In search of the dugong."

November 19 - Dr. Elizabeth L. Venrick, Scripps Institute of Oceanography, spoke on "Science and the real world: A communications gap."

November 10 - Dr. Pieter Gaemers, University of Leiden, the Netherlands, talked about "The evolution of codfishes based on their otoliths--towards a new evolutionary theory."

Tiburon Laboratory

November 6 - Maxwell Eldridge of the Tiburon Lab spoke on "Physiologic responses of embryos and larvae of striped bass to low level, sublethal concentrations of benzene," at a seminar with San Francisco State University/Tiburon Laboratory.

November 19 - William T. Davoren, U.S. Fish and Wildlife Service and Director of the Bay Area Institute Office, presented a talk on "The unnatural history of San Francisco Bay--A review of the past 40 years, and a non-romantic assessment of the next 20," at a joint San Francisco State University/Tiburon Laboratoryseminar.

PRESS RELEASES

La Jolla Laboratory

November 10 - "Tiny 'magnet' crystals may help animals to navigate."

TRAINING

Honolulu Laborator

November 13-14 Dr. Andrew Dizon, Tamio Otsu, Richard Uchida, and Dr. Jerry Wetherall attended the Merit Pay Appraisal Training class in Honolulu, HI.

La Jolla Laboratory

November 17-18 - The following SWFC personnel attended the Merit Pay Appraisal Training course at the La Jolla Laboratory: Richard Shomura, Director of the Honolulu Lab; from the La Jolla Lab: Deputy Director John Carr, David Mackett, Fred Kellenberger, Ben Remington, Dr. Daniel Huppert, Dr. Gary Stauffer, and Dr. Reuben Lasker; from the Tiburon Laboratory: Director Norman Abramson, Dr. Edmund Hobson, Dr. William Lenarz, and Dr. Jeannette Whipple; and from the Pacific Environmental Group (PEG): Dr. Douglas McLain and Gunter Seckel.

November 19-20 - Dr. Michael Laurs and Dr. Wesley Parks of the La Jolla Lab attended the Merit Pay Appraisal Training Course at the Southwest Regional Office, Terminal Island, CA. Sus Kato of the Tiburon Lab, and Andrew Bakun of PEG also attended.

November 23-25 - Dr. Gary Sakagawa attended a Merit Pay Training class in Washington, D.C.

Tiburon Laboratory

November 5-7 - Delores M. Fussy, Secretary - OPM "Professional Development for Secretaries."

November 12-14 - Maureen H. Woods, Librarian - Online 80 Inc., "Online 80."

VISITORS

La Jolla Laboratory

November 5-7 - Richard N. Uchida, SWFC, Honolulu Laboratory, HI.

November 6 - Allan Stone, DEC, Honolulu, HI.

November 6-10 - Dr. Pieter A. M. Gaemers, Niels Stensen Foundation/ Ryksmuseum van Geologie en Mineralogie, University of Leiden, Netherlands.

November 17 - L. Somerherz, Auke Bay Lab, NMFS, Auke Bay, Alaska.

November 18 - Jesse Macias, KFMB-TV 8, San Diego, CA.

- Bill Trahant, The Clary Institute, Washington, D.C.

November 20 - Ens. Jakubosky, Marine Science Tech-3 Geraght, Marine Science Tech-3 Sines, U.S. Coast Guard Cutter Morgenthal, San Francisco, CA.

November 21 - Doris S. Lequin, Mary Treusdell, and Donna Moore, Naval Surface Weapons Center, Silver Spring, MD.

- Nikolas Camejo, Center for Marine Studies, San Diego State University, San Diego, CA.

Tiburon Laboratory

November 5 - Bud Armstrong, Golden Gate Sport Fishers, Sausalito, CA.

- Bernard A. Chilo, Fort Cronkite, CA.

- Zeke Grader, Pacific Coast Federation of Fishermen's Associations, Sausalito, CA.

- Edward T. LaRoe, Department of Interior, Washington, D.C.

- Arthur Reynolds, Editor, Irish Shipper, Dublin, Ireland.

November 7 - Carroll McCutcheon, Chief, Personnel Division, NASO, Seattle, WA.

- Dr. Sergei Doroshov, R. Buddington, C. Cherr, and W. Clark, University of California, Davis, CA.

- Kathryn Hogan and Richard Nelson, U.C. Bodega Marine Laboratory, Bodega Bay, CA.

- Dewayne Johnston and Miles Young, California Department of Fish and Game, Menlo Park, CA.

November 11 - Ann Chamberlain, San Francisco State University, San Francisco, CA.

November 12 - Bruce Wyatt, University of California Sea Grant, Ukiah, CA.

November 13 - Tim Farley, California Department of Fish and Game, Sacramento, CA.

- Ed Melvin, Sea Grant Marine Advisor, Watsonville, CA.

November 18 - Sennen Salapare, U.S. Customs Service, San Francisco, CA.

- Bruce Wyatt, University of California Sea Grant, Ukiah, CA.

November 21 - David Hunn, U.S. Coast Guard, Oakland, CA.

- Valerie McQuat and Michael Thompson, Fort Mason, San Francisco, CA.

November 25 - Ken Sokolski, Scripps Institute of Oceanography, La Jolla, CA.

Pacific Environmental Group

November 6 - Carrol McCutcheon, NASO Personnel, Seattle, WA.

November 21 - Jim Waldvogel, U.C. Sea Grant, Crescent City, CA.

- Ed Melvin, U.C. Sea Grant, Watsonville, CA.

November 28 - Raul Berrios, University of Chile, Santiago, Chile.

MEETINGS AND TRAVEL

Honolulu Laboratory

November 3 - Director Richard Shomura, Dr. Michael Adams, Dr. Jerry Wetherall, Howard Yoshida, and Heeny Yuen attended a meeting of the Billfish Plan Development Team to review the recent draft of the FMP prepared by the staff of the Western Pacific Regional Fisheries Management Council (WPRFMC).

November 4 - R. Shomura met with Dr. Jeffrey Polovina and Dr. Wetherall to discuss technical aspects of possible baitfish sampling schemes for French Frigate Shoals.

November 5 - R. Shomura, Dr. Adams, and H. Yuen attended a meeting of the Billfish Advisory Subpanel of the WPRFMC.

- R. Shomura and Tamio Otsu met with local fishing

industry people including Frank Goto, Alika Cooper, Jerry Kinney, Winfred Ho, Jeff Yee, Brooks Takenaka, and Buzzy Agard, to discuss the Honolulu Laboratory's cooperative squid research project.

November 6-7 - R. Shomura attended the 20th meeting of the Scientific and Statistical Committee of the WPRFMC.

November 7 - R. Shomura met with Dr. Adams, Fletcher Riggs, Ray Sumida, and H. Yoshida to review the draft contract to collect fisheries data in American Samoa, Northern Mariana Islands, and Guam, prepared by the staff of the WPRFMC.

November 12-13 - R. Shomura attended the WPRFMC meeting at the State Capitol.

November 14 - R. Shomura, Dr. Polovina, Reginald Gooding, and James Uchiyama attended a Resource Assessment Investigation of the Mariana Archipelago (RAIOMA) meeting in the Honolulu Laboratory conference room.

- R. Shomura, F. Riggs, R. Sumida, and H. Yoshida participated in a meeting attended by staff members of the WPRFMC and Harry Kami and Dr. Paul Callahan from Guam, to discuss fishery data collection.

November 20-22 - R. Shomura, T. Otsu, and Walter Matsumoto traveled to Hawaii to meet with fishing industry people in Hilo and Kona to discuss the Honolulu Laboratory-University of Hokkaido cooperative squid project.

November 24 - R. Shomura participated in a meeting of the Coordinating Council on Research in the NWHI.

November 25 - R. Shomura participated in a Sea Grant Advisory Council meeting.

November 26 - R. Shomura and several staff members of the Honolulu Laboratory and the Western Pacific Program Office met with Kimbal Thompson of Trans Oceanic Architectural Design, Ltd., to discuss the proposed addition to the Honolulu Laboratory building.

La Jolla Laboratory

October 25-November 16 - Dr. Paul Smith traveled to Lima, Peru, to participate in a cooperative study of spawning rate and estimated spawning biomass of coastal pelagic schooling fishes off Peru.

November 1-20 - Dr. Gary Sakagawa and Dr. Wesley Parks traveled to Madrid, Spain, to participate in meetings of the International Commission for the Conservation of Atlantic Tunas (ICCAT).

November 1-12 - Dr. Norm Bartoo and Dick Evans attended the ICCAT meetings in Madrid, Spain.

November 4-7 - Dorothy Roll traveled to Washington, D.C., to attend a meeting with NMFS, NOAA, and DOC officials on the shared request for procurement of mini-computer systems, and to attend the Federal Office Automation Conference.

November 5-8 - Dr. Daniel Huppert traveled to Philadelphia, PA., and to Newark, DE., to participate in a workshop on Economic Analysis in Fisheries Management Plans at the University of Delaware, Newark, DE.

November 5-7 - Dr. Michael Laurs traveled to Washington, D.C. to attend an awards ceremony and receive his DOC silver Medal of Merit.

November 5-11 - Dr. John Hunter traveled to Washington, D.C., to attend an awards ceremony and receive his DOC Gold Medal of Merit.

November 9-13 - Fred Kellenberger traveled to Seattle, WA., to attend the Pacific Coast Fisheries Data Committee meeting.

November 9-14 - Dr. Reuben Lasker traveled to Sitka, Alaska, to attend a PROBES group meeting and to review research results on larval pollock.

November 9-15 - Dr. Gary Stauffer presented seminars on methods of biomass estimation at CICIMAR in La Paz, Baja California Sur, Mexico.

November 12 - Lt. Mark Sullivan attended the Federal ADP Council meeting in San Diego, California.

November 16-18 - Dr. Michael Laurs went to Boulder, CO., to attend a planning meeting for remote sensing FY 83 initiative and NOSS user working group meeting.

November 17-21 - Dr. William Perrin traveled to Boston, MA., to cover the Atlantic humpback workshop for the Marine Mammal Commission.

November 19 - Dr. Reuben Lasker attended a Southern California Coastal Resources Program meeting in Los Angeles, CA.

November 19-21 - Dr. Izadore Barrett, Director of the La Jolla Lab, went to Seattle, WA., to attend an NMFS Research Council meeting.

Tiburon Laboratory

November 1-3 - William Leet traveled to Monterey, CA., to install electronic equipment aboard a fishing vessel.

November 5-8 - Sus Kato and William Leet met with researchers and fishing industry members in Morro Bay, Avila Beach, Santa Barbara, and Monterey, CA.. to discuss plans for forthcoming cruises and fishery development projects.

November 7 - Edward Ueber traveled to Montery, CA., to interview processors of groundfish and sablefish.

November 8-15 - Peter Adams, James R. Chess, Daniel Howard, and Susan Smith of the Predator-Prey and Rickfish Analysis Tasks, and Michael Bowers, Physiology, participated in the Sebastes jordani cruise off central California aboard the Research Vessel David Starr Jordan.

November 20-21 - Dr. William H. Lenarz traveled to Seattle, WA., to attend a Meeting of the Groundfish Plan Development Team of the Pacific Fishery Management Council.

November 25 - Sus Kato traveled to Albany, CA., to attend the Joint Panel Meeting on Protein Resources, sponsored by UJNR (United States/Japan cooperative study group) at the Western Regional Research Center of the Department of Agriculture.

November 28 - Edward Ueber traveled to Sacramento, CA., and met with processors to discuss rockfish and sablefish fisheries.

Pacific Environmental Group

November 12-20 - Dr. Richard Parrish traveled to La Jolla, CA., and boarded research vessel Chapman to conduct sablefish research.

PERSONNEL ACTIONS

Honolulu Laboratory

September 7 - Hazel S. Nishimura, Librarian - Promotion

October 5 - Victor A. Honda, Biological Technician (Fisheries) - Promotion

- Robert L. Humphreys, Jr., Biological Technician (Fisheries) - Promotion

- James H. Uchiyama, Fishery Biologist - Promotion

November 2 - William B. Barnett, Biological Technician (Fisheries) - Full-time temporary appointment

November 10 - Michael P. Seki, Biological Aid (Fisheries) - Full-time temporary appointment

November 16 - Howard O. Yoshida, Fishery Biologist - Promotion

November 30 - Roy Mendelssohn, Operations Research Analyst - Promotion

La Jolla Laboratory

November 3 - Sheila Foster, Editorial Clerk - Temporary appointment

- Emille Cole, Clerk Typist - Temporary appointment

November 10 - David Eriat, Computer Clerk - Temporary appointment

- Helen Mills, Computer Clerk - Temporary appointment

- Karen Wyatt, Computer Clerk - Temporary appointment

Tiburon Laboratory

November 12 - Appointments (Intermittent):

- Michael G. King, Biological Aide

- Sally J. Krem, Biological Aide

- Sonia A. Linnik, Biological Aide

November 24 - Patrick J. Guillemot, Biological Aide

November 30 - Susan M. Pollock, Biological Aide - Extension of Appointment, 130 days

UNITED STATES
DEPARTMENT OF COMMERCE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE
SOUTHWEST FISHERIES CENTER
8604 LA JOLLA SHORES DRIVE
P.O. BOX 271
LA JOLLA, CALIFORNIA 92038

OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE, $300

AN EQUAL OPPORTUNITY EMPLOYER

POSTAGE AND FEES PAID
DEPARTMENT OF COMMERCE
210

THIRD CLASS